DUALOX®

An optimised two-stage oxygen delignification process

GL&V's DUALOX® two-stage oxygen delignification process enables an overall optimisation of the oxygen delignification process both with regards to kappa reduction and selectivity, which is not feasible in any other oxygen delignification concept. The process is particularly useful for softwood kraft mills.

Installation at Daishowa Suzukawa Mill, Japan

Process considerations

GL&V's DUALOX oxygen delignification process comprising two reactors with very different reaction conditions regarding retention time, reaction temperature and pressure, thus explaining the word "dual" in the name.

With this process concept the main reactor is complemented with a small prereactor, preferably in the form of a thick pipe with a retention time of five minutes.

The process design is based on a thorough understanding of the fundamental concepts of oxygen delignification kinetics.

To achieve the maximum delignification of any two-stage process, the intermediate mixer as well as the pump are key. This intermediate pump makes operation at a high pressure in the main reactor feasible, which of course is an important feature considering the long retention time of this reactor.

Benefits compared to a single-stage process

- Extended delignification feasible
- More selective delignification
- Simple design
- Flexibility to choose pressure and temperature in both reactors

Process description

Pulp is fed to the reactor with a pump. Alkali (sodium hydroxide or normally oxidised white liquor) is added to the pulp prior to the pump.

A small amount of oxygen is added and thoroughly mixed into the pulp suspension in a mixer positioned after the pump. In the alkaline environment the oxygen forms a stable gas dispersion in the pulp.

The mixture enters the prereactor as a plug flow while the oxygen is continuously consumed in reactions with the lignin in the pulp. After leaving the prereactor the pulp enters a second pump, where the pressure is increased to a high level.

After the pump, the pulp is further treated in a second mixer, where the main part of oxygen is added together with MP-steam to increase the temperature before entering the second, larger reactor.

The pulp leaves the second reactor and enters a blow tank, which also serves as a stand pipe for a pump. Upon leaving the reactor the pressure in the pulp flow is released and the temperature at the same time maximised to the atmospheric boiling point of the suspension. Flash steam and residual gases are vented out. The pulp is fed by a pump to the subsequent washing.

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